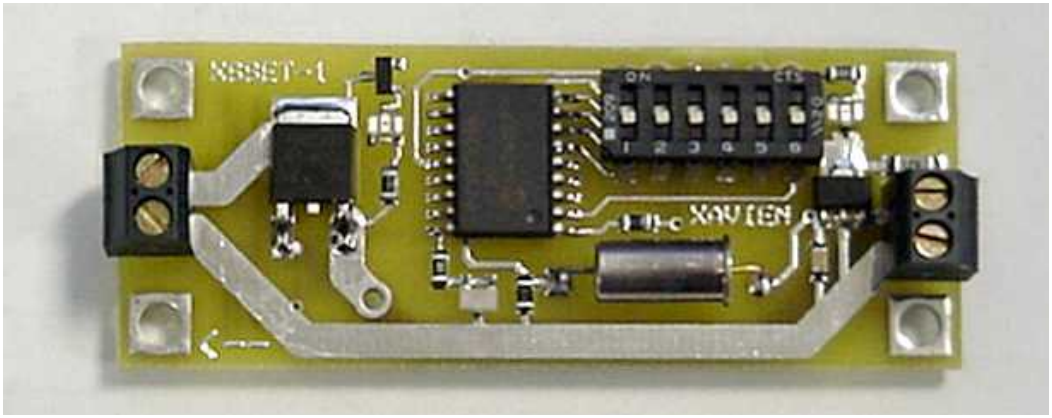
“XSSET-1” - Xavien Single Stage Event Timer

User Manual and Instructions



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System Overview

The “XSSET-1” is a precise single stage “G-SWITCH” activated timing and control system. Time and mode settings are set using a six-position DIP switch that eases programming the unit. It runs off of an external DC power supply ranging from +7V to +15V. Other applications such as relay switching and solenoid driving can also be implemented using the “XSSET-1”. Various electric matches may be used because of the versatility and high current FETs used in the design of the “XSSET-1”; these include, but are not limited to; Quickburst, Daveyfire and OXRAL.

Specifications

Battery	external 7-15 VDC
PEAK Firing Current	10A @ 5sec.
Dimensions	0.95” (+/- 0.05”) W x 2.5” (+/- 0.02”) L
Weight (without battery)	≈20.0 grams
Nominal Battery Load	15mA
Delay Settings	1 second to 31 seconds (in 1 sec. increments)

Operational Overview

Figure 1 depicts the component layout of the “XSSET-1”. The ON positions for the switches are labeled at the top of each DIP switch pack.

Figure 1. “XSSET-1” Assembly.

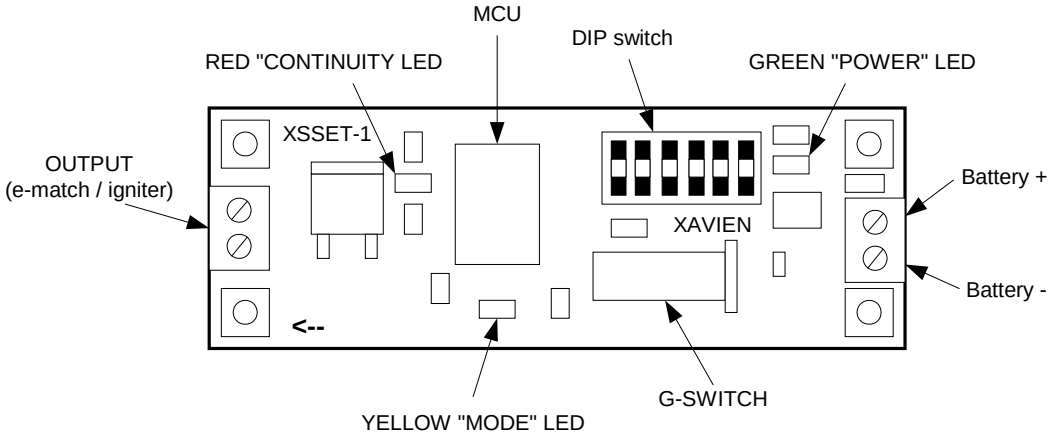
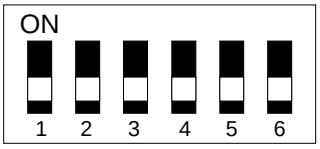


Figure 2 gives a close look at the DIP switches and explains the time value of each switch. Table 1 gives examples of a few settings. For example, to get a delay of 10 seconds you would turn ON switch 2 and switch 4 (2 seconds + 8 seconds = 10 seconds), the rest would be OFF. Figure 3 gives you switch examples for both modes of operation.

Figure 2. DIP Switch with all switches in the OFF position.



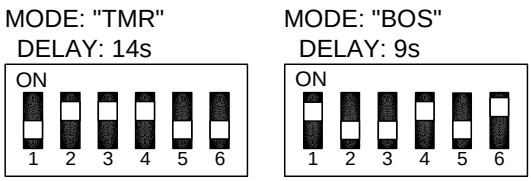
Switch	Time Value
1	1 second
2	2 seconds
3	4 seconds
4	8 seconds
5	16 seconds
6	“MODE” Select

**** IMPORTANT**: Switches *MUST* be set prior to turning power on to “XSSET-1”. The microcontroller *ONLY* reads the switch settings on power up. If changes need to be made, turn unit OFF, set switches, and cycle power back ON.**

Table 1 (Example of delay settings)

Switch Settings ST1[1, 2, 3, 4, 5, 6]	Time Delay STAGE 1
Off-Off-Off-Off-Off-Off	1 second : MODE = TMR
On-Off-Off-Off-Off-Off	1 second : MODE = TMR
Off-On-Off-Off-Off-Off	2 seconds : MODE = TMR
On-On-Off-Off-Off-Off	3 seconds : MODE = TMR
Off-On-Off-On-Off-Off	10 seconds : MODE = TMR
Off-Off-Off-Off-On-Off	16 seconds : MODE = TMR
Off-On-On-Off-On-Off	22 seconds : MODE = TMR
Off-Off-Off-Off-Off-On	1 second : MODE = BOS
On-Off-Off-Off-Off-On	1 second : MODE = BOS
Off-On-Off-Off-Off-On	2 seconds : MODE = BOS
On-On-Off-Off-Off-On	3 seconds : MODE = BOS
Off-On-Off-On-Off-On	10 seconds : MODE = BOS
On-On-On-On-On-On	31 seconds : MODE = BOS

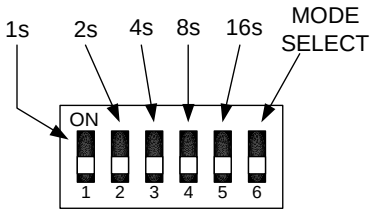
Figure 3. Example switch settings.



“XSSET-1” MODES:

The “XSSET-1” has 2 modes of operation, “TMR” (TIMER) and “BOS” (BURN-OUT SENSE). In “TMR” mode the unit begins countdown as soon as the “G-SWITCH” is ***CLOSED (launched)***. In “BOS” mode the unit begins countdown after the “G-SWITCH” has ***CLOSED*** and ***OPENED (motor burns out)***. For both modes we do a 0.5s sample of the “G-SWITCH” to help prevent a misfire by someone “bumping” the rocket. The “TMR” and “BOS” modes are chosen by the sixth (position 6) DIP switch. When the switch is OFF the unit is in “TMR” mode and when the switch is ON the unit is in “BOS” mode. Figure 4 shows DIP switch values.

Figure 4. DIP switch values.



The “BOS” mode is especially useful for parachute / streamer deployment. You set the timer for how long ***after the motor has burned out*** you want to wait before igniting your charge. The “TMR” mode is useful if you want to either air start motors (cluster) or ignite a secondary stage of your rocket. You set the dip switches for how long you want to wait ***after the rocket is launched*** before you activate your charge.

Figure 5. Basic Diagram of a single stage rocket using the "XSSET-1" in "BOS" mode.

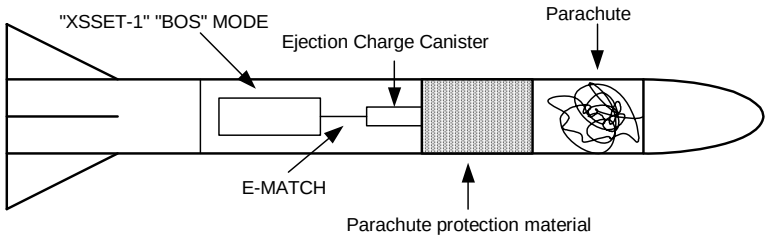
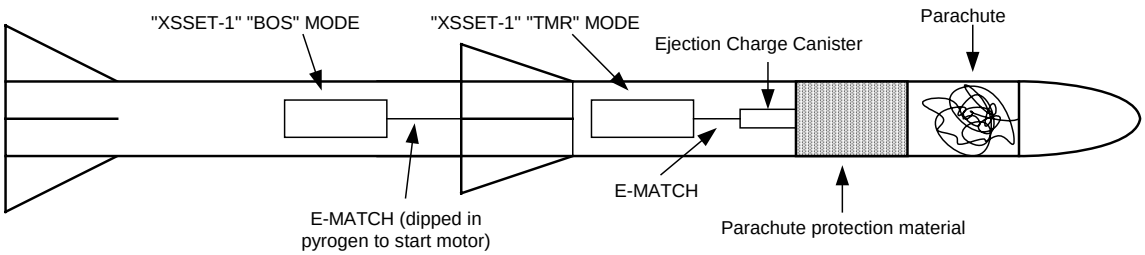


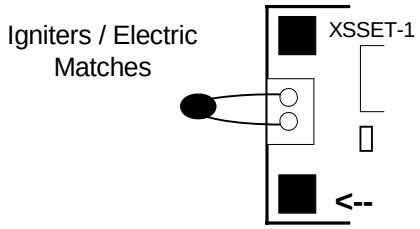
Figure 6. Basic diagram of a dual stage rocket using a "XSSET-1" in "BOS" mode and a "XSSET-1" in "TMR" mode.



Pyrotechnic Installation:

The “XSSET-1” has been tested using various igniters and electric matches. To install a pyrotechnic device onto the “XSSET-1” *(power needs to be OFF)*, you simply unscrew the terminals located as in figure 7. The terminals are screw based terminal blocks for easy access and reliability. *User does not need to worry about which terminal goes to which leg of the igniter / electric match.* Make sure you **hand tighten ONLY (too much torque can damage the unit)** screw terminals after igniter / electric match has been installed.

Figure 7. Pyrotechnic device install location.



Recommended igniter / electric matches:

The “XMFT-1” has been tested using the Quickburst “HOT SHOT”, Daveyfire and OXRAL electric matches. It is always recommended that you “dip” your e-matches into pyrogen to help with motor ignition. It is recommended that you test the model you are using to insure proper ignition occurs. We here at XAVIEN have used electric matches that are easily available to us for testing. If you are using something different than what is listed and want to make sure it will work before buying a “XMFT-1” email us, and we will look into testing a unit using your model of electric match. ***Our time is limited so no guarantees on how fast we can do this.***

Electric Match Sources:

Manufacturers:

- Daveyfire
  www.daveyfire.com

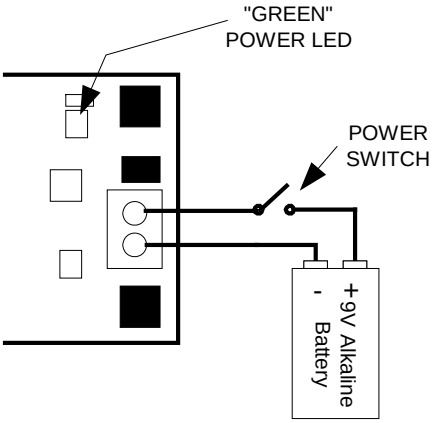
- Luna Tech / OXRAL
  www.oxral.com
  www.pyropak.com

- Quickburst
  www.quickburst.net

Battery Connections:

The “XSSET-1” was designed to operate using a 9V alkaline battery. We here at XAVIEN recommend using a switch to insure ease of use when powering the unit up and down. We have equipped the unit with a small green power indicator so the user can easily identify when the unit has power applied. It is recommended that the user do tests using their igniter / electric match configurations before “assuming” anything will work. This will help to insure that the “XSSET-1” and your configuration will work to your expectations. In figure 8 we have a basic diagram of the battery connections that are recommended by us. **It is always a good idea to insure you have a fresh (new) battery before any launches occur. After all, the cost of a battery is nothing compared to the time and money spent on many of our users rockets.**

Figure 8. Recommended battery connections.



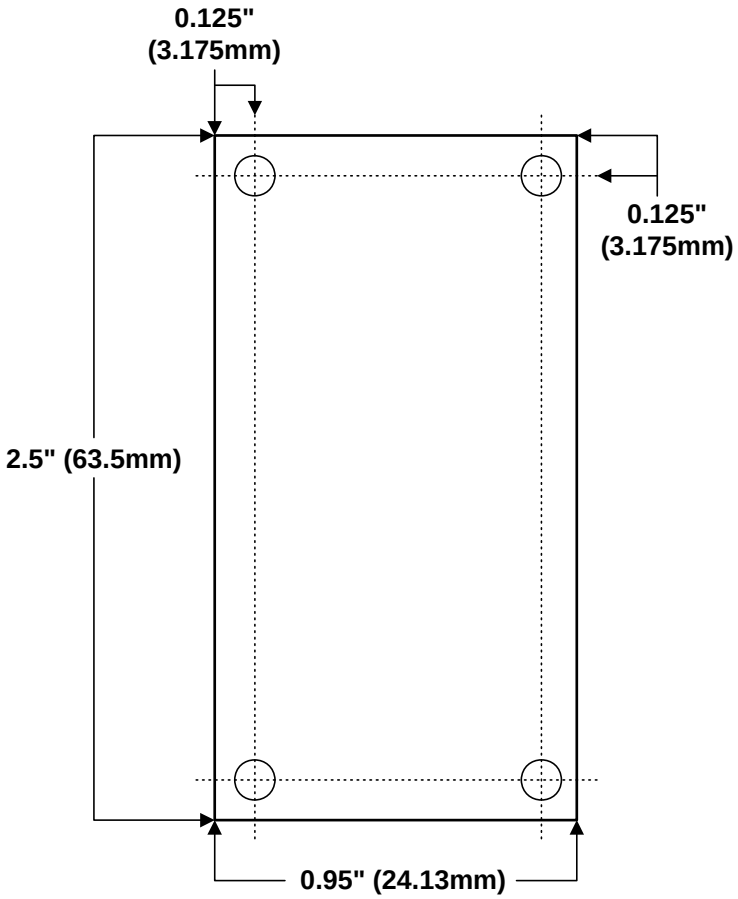
Setup Sequence:

This is the recommended sequence for setting up the “XSSET-1”.

1. Make sure unit is **NOT** powered up, if it is turn it OFF,
2. Set DIP switches to desired time delay.
3. Install igniter / electric match, making sure screw terminals are not loose, hand tighten only.
4. Install a fresh 9V battery, making sure screw terminals are not loose, hand tighten only. Reversing the polarity of the battery can damage the “XSSET-1”, when installing the battery refer to **figure 8** for the correct polarity.
5. Turn “POWER” on to XSSET-1; verify that the GREEN (“POWER”) LED and the RED (“CONTINUITY”) LED’s are ON. If the RED LED is OFF you have a continuity issue with your pyro, if the GREEN LED is OFF, you have a power problem. If both LED’s are on, unit is ready for launch!

Mounting / Installation

The “XSSET-1” must be installed securely to prevent the unit from being damaged during use. Since this unit does depend on a “G-SWITCH”, orientation of the unit is very important, the “arrow” must be pointing in the direction of travel. The mounting holes are 0.125”; this allows various size screws to be used. Just verify the clearance of both the screw and the head to insure a proper fit without damaging the unit.



URGENT: *The “XSSET-1” MUST be protected from ejection charge and motor residue. These are corrosive and over time can damage the “XSSET-1”. If this occurs, the warranty does not cover this type of damage. It is good practice to clean the unit using Isopropyl Alcohol (70% alcohol or better).*

** Handling Precautions **

These units are sensitive to damage from ESD and should always be handled in a properly grounded environment; damage from ESD is not covered under the warranty. Never transport or handle a rocket with an “XSSET-1” that is powered up and connected to live pyrotechnic charges. When installing electric matches in a “XSSET-1”, make sure unit is powered off. Before launching verify that the RED “CONTINUITY” LED is on.

!! Product Disclaimer and Limit of Liability !!

Since the use and application of this equipment are beyond our control, the purchaser or user agrees to hold “XAVIEN” and their agents from any and all legal claims, demands, actions, debts, liabilities, judgments, costs and attorney fees arising out of, claimed on account of, or in any manner predicted upon loss or damage to property of, or injuries to or death of, any and all persons arising out of the use of this equipment. Due to the nature of electronic devices, the application and environments for these devices, the possibility of failure can never be completely ruled out. It is the responsibility of the purchaser or user of this equipment to properly test and simulate the actual conditions under which the device is intended to be used to ensure the highest degree of reliability, safety and success.

!! Product Warranty !!

The “XSSET-1” has a warranty of 1 year starting from date of purchase as long as all the guidelines have been followed that are outlined is this document. Any improper use or carelessness on the part of user will void the warranty. If your unit has problems send an email to:

RMA@XAVIEN.COM

Once this has been done, XAVIEN will send you a return material authorization (RMA) number that you need to include with your unit. **DO NOT send any units back to XAVIEN without this RMA number, if we receive product with no RMA it will NOT be accepted and mailed back unrepaired.**

Revision History

PCB REV: 1.00A	DATE: 07/16/2004
FW REV: 1.00A	DATE: 07/16/2004
DOC REV: 1.01A	DATE: 08/09/2005 [UPDATED LOGO]